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THE CHIEF EXECUTIVE IN LOCAL GOVERNMENT INFORMATION SYSTEMS: CATALYST OR BARRIER TO INNOVATION?

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Abstract—This study develops a construct of executive support for technological innovation and explores the correlates of its components. The context involves the perceptions of local government chief executives regarding the current and expected utility of computing technology. The findings suggest that executive support for the adoption of computing is flawed by unrealistic expectations and might contribute to overadoption of the technology.

TECHNOLOGICAL innovation is increasingly viewed as a primary means to improve the productivity and effectiveness of urban governments [1]. Large investments have been made in the development and diffusion of various physical and management technologies such as computers, management science techniques and information systems. However, widespread failure in achieving the potential of these technologies has been reported [2–6] and failures frequently have been attributed to the lack of chief executive support for innovation adoption [7, 8]. Nowhere is this critique more apparent than in the adoption of innovations in local governments [9, 10].

Yet other recent analyses of technological innovation in local government suggest that chief executives play an important role in the adoption of innovations. Chief executives interject themselves into the technological decision making processes of line agencies, stimulate line agencies to perceive performance gaps that might be closed by technological innovations, and provide moral and financial support for innovation adoption [11]. But, the complex and fractionated nature of local government decision making makes the chief executive's specific relationship to innovation adoption uncertain. The major actors and their special roles are difficult to identify, technological leadership is primarily a characteristic of specific functional agencies rather than an organization-wide phenomenon, and the specific role of 'overhead' agencies and executives is unclear [12].

Thus, while there is some agreement on the importance of 'overhead' influences in local government innovation processes, the chief executive's specific role is unclear. Moreover, the literature presents an interesting dilemma. How is it that some studies indicate executives might be considerably involved and supportive of technological innovation, while other current studies indict the executives for lack of support? Is there anything about the character of the chief executives' support that warrants the frequent indictments linking the executives to innovation failures?

Two interrelated aspects of chief executive support pertinent to our understanding of technological innovation in local governments are investigated in this study: (1) the concept of executive support for technological innovation and (2) the correlates of the judgmental components of executive support for technological innovation. These issues

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are analyzed in the context of a particular set of technological innovations—computer applications. The significance of understanding these innovations is evident from the magnitude of current expenditures for computing, the breadth and diversity of computer applications and the potential impacts from computer use [13, 14]. An understanding of the factors influencing executive support for these technology-specific innovations might be extremely useful for policymakers generally concerned with the diffusion of innovations, chief executives engaged in specific innovation activities, and entrepreneurs interested in reaching the local government market with their products.

THE CONCEPT OF EXECUTIVE SUPPORT

Studies which identify executive support as a determinant of innovation and implementation fall generally into two categories: (1) those that analyze the executive's supportiveness of technological innovation in which organizational role or position is the primary focus of the research [11, 12, 15–17] and (2) those that analyze various dimensions of individual openness to change in which an individual's organizational position is treated as a secondary or unanalyzed variable in the research [18, 19].

In these studies, executive support usually has been measured in one of two ways: (1) as the favorableness of beliefs or attitudes about a particular technology or set of technologies, or, more generally as openness to change and (2) as observationally defined acts indicating commitment or the exercise of influence in efforts to incorporate technological innovations.

These conceptual and operational approaches to executive support have several shortcomings. Attitudinal studies, whether concerned with general or specific attitudes toward change utilize a single attitudinal measure to operationalize the support concept [18]. In addition, studies which focus on general attitudes toward change, or on ideologies that would influence a specific type of innovation, tend to ignore the relationship between individual attributes and organizational attributes [20, 21]. While behavioral studies can be expected to have a more direct linkage to innovation outcomes than the attitudinal studies, they have been unable to shed much light thus far on what motivates the executive's behavior. Furthermore, the measurement of executive behavior has not contributed significantly to an understanding of either what types of behavior or what combinations of behaviors are instrumental in innovation adoption [20].

In the present study, 'support' is conceptualized as an outcome of two components of an individual's perceptions—current and expected utility. Current utility refers to the individual's perception of the current contribution of the technology as shaped by personal or 'locally reported' experience with the technology. Expected utility refers to the individual's perception of the potential or future contribution of the technology as shaped by extrapolation of current experiences and by general images about the technology portrayed in the society. 'Support' is conceptualized as the the difference between an individual's perception of the expected utility of a technological innovation and an individual's perception of the current utility of the technology. The more positive the difference between the individual's perception of expected and current utility, the greater his support. The more negative the difference between the individual's perception of expected and current utility, the less his support.

This conceptualization treats support as a predisposition grounded in an individual's value and cognitive judgments of a specific technology or set of technologies [4, 22]. It is a predisposition towards technology which depends on a positive relationship between future expected benefits from a technology and current, specific, identifiable benefits derived therefrom. Support, therefore, is highly rational; it is 'given for returns'. Support also is highly contingent; it varies more or less with successes and failures [15, 23, 24].

Our approach to the study of executive support can be understood by reference to an overall model of the relation between executive support and technological innovation shown in Fig. 1. Moving left to right in the figure, technological innovation is

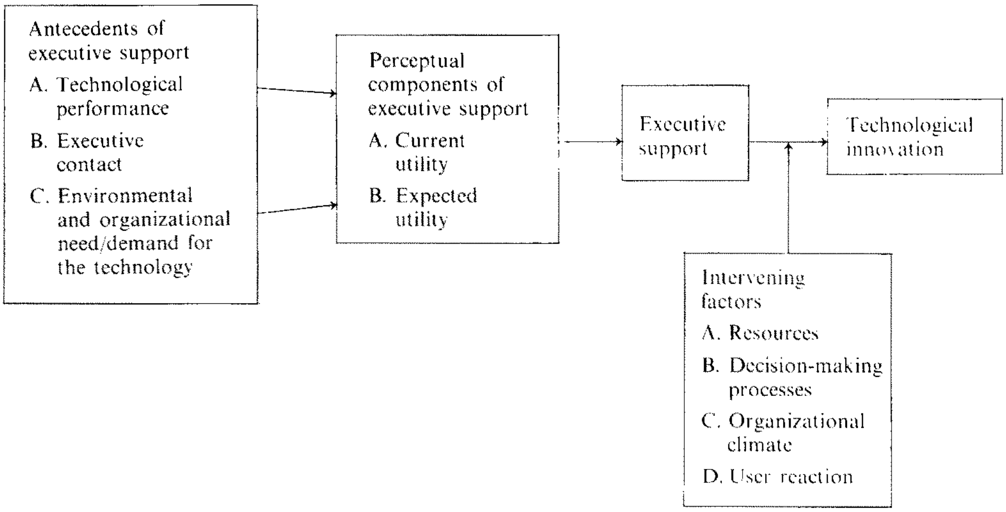

Fig. 1. Model of executive influence in the technological innovation process.

viewed as a product of executive support and several intervening organizational factors such as the existence of slack resources and the kind of decision-making processes employed. Executive support *itself* is viewed as the outcome of two perceptual components: current and expected utility. These perceptions of utility held by executives, in turn, are viewed as related to several antecedents, particularly the current performance of the technology, the executive's contact with the technology, and environmental or organizational need/demand for the technology's use. In this context, then, we analyze the antecedents of the components of executive support, as a basis for understanding more about the nature of executive support for technological innovation.

Analysis of the correlates of each of the perceptual components that influence the chief executive's predisposition toward technological innovation might provide an indication of how different factors contribute to a chief executive's policy judgments. What factors influence an individual's perceptions of the contribution of a technology? What factors influence an individual's expectations about a technology? Are these perceptions legitimate or are they based on misinformation or unrealistic expectations? Investigation of these questions should provide some insight into the probable appropriateness or inappropriateness of a chief executive's predisposition to support a technology. It also might lend insight into why the literature depicts chief executives as supportive of technological innovation and, at the same time, indicts them for implementation failures.

ANTECEDENTS OF THE PERCEPTUAL COMPONENTS OF SUPPORT

Mohr [18, p. 112], as well as other critical reviewers of existing innovation research [20, 25, 26], notes that the empirical research on innovation employs "a strikingly heterogeneous selection of independent variables". The strategy in this study was to select variables which, on the basis of an *a priori* judgment, could be expected to influence either a chief executive's perception of the technology's contribution or a chief executive's perception of its expected utility. Three types of variables were explored: technological performance, executive contact and need/demand for the technology.

Technological performance is, in part, an elaboration of the concept of performance gaps. Rogers and Agarwala-Rogers [27] define performance gaps as "perceptions of discrepancies between the organization's expectations and its actualities". Performance gaps have theoretically been treated as precursors of search behavior leading to organizational decisions to adopt innovations. However, when considering an innovation which is in some ways continuous, i.e. a new program similar to others implemented by an organization or a new computer application analogous to others adopted by an organization, the performance of these 'technologies-in-practice' should influence the search and decision behavior of organizational members. In particular, we would expect the quality of technological performance to affect a chief executive's perception of the contribution of the technology and a chief executive's perception of its expected utility.

The second set of factors which should influence perceptions is the amount of contact between the chief executive and the technology. An individual's use of a particular technology, for instance, might be an indication that the individual has some instrumental or sentimental attachment to the technology. For example, Swanson [57] indicates that a manager's involvement with a management information system, either as a design participant or as an end user, produces appreciation of the system. The extent of an individual's familiarity with a technology also may be evidence of the individual's exposure to an environment which provides information supportive of the technology [22, 28]. We would expect that use of a technology, or at least some familiarity with its capabilities, will be associated with perceptions of a technology's contribution and its expected utility.

The final hypothesized set of factors which potentially influence individual perceptions of a technology's current or expected utility are environmental and organizational definitions of need and demand for the technology. Rogers and Eveland [29], Mohr [18], Yin *et al.* [12] and Bingham [30] conclude that environmental and organizational pressures are critical factors in the local government innovation process. How these system attributes are translated into organizational action, however, is an unresolved issue in the literature. Bingham [30, p. 95] suggests that local government innovation is primarily a reflection of community and organizational political and social structures:

> The community environment is directly related to policy adoptions in local government. The community environment is not directly related to bureaucratic innovation; however, the independent contributions to bureaucratic innovation beyond certain characteristics of the organization itself (e.g. size of the organization) are limited to responses to direct policy, and excess resources made available to the bureaucratic organization of the political system.

A less deterministic and possibly more accurate representation of the relationship between environmental and organizational factors and innovation would include the moderating influence of organizational member perceptions in the explanation. One of several linkages then between environmental and organizational variables and local government innovation would be through their effects on member attitudes and perception and, in turn, on member behavior in organizational decision making. Thus, we expect environmental and organizational definitions of need and demand for the technology to be associated with perceived contribution and expected utility.

METHODS

Data collection

Self-reporting questionnaires on data processing were distributed nationally to city and county governments in early 1975. The questionnaires were sent to all cities over 50,000 population and all counties over 100,000 population. Separate questionnaires were distributed to chief executives and data processing installation managers in each city and county. Indicators of technological performance and executive contact were derived from the responses of both the chief executives and the data processing managers. Secondary data from the *City and County Data Book 1972* and the U.S. Census were the sources of indicators of the need/demand variables. This section discusses the development of the measures that were used in the study and the expected relationships among the measures.

Measurement of current and expected utility

The current and expected utility scales were derived from chief executive responses to the ten items in Table 1. Factor analysis of the ten items resulted in two independent factors with average loadings of 0.56 for the current utility items and 0.50 for the expected utility items. The average inter-item correlations for the current and expected utility items were 0.34 and 0.28, respectively. In constructing the scales, the raw scores for the items were summed and the scales were then converted to standard scores. Coefficient alpha for the current utility scale is 0.80 and for the expected utility scale is 0.67.

Table 1. Items used in developing the current and expected utility scales

Current utility

Item

(1). In general, computers provide information which is helpful to me in making decisions.
(2). The computer makes information available to department heads that was not available before.
(3). The computer is an essential tool in the day-to-day operations of this government.
(4). Computing and data processing have generally failed to live up to my original expectations. (Reversed)
(5). For the most part, computers have clearly increased the speed and ease of performance of government operations where they have been applied.
(6). The use of computers and data processing results in greater co-operation among the operating departments and agencies.
(7). I have indicated to department heads that computers and data processing should be used wherever economically feasible in this government.

Expected utility

(1). In the future, the computer will become much more essential in the day-to-day operations of this government.
(2). In the future, a larger proportion of this local government's budget should support computers and data processing.
(3). If properly designed and managed, much of the data gathered by this government in its daily operations could be collected and organized in ways that provide useful information about community conditions and government operations.

Based upon the arguments in the literature [11, 17, 18], the support construct (i.e. the difference between expected utility and current utility) should predict criterion measures of technological innovation. Two measures of computing adoption were developed to test the criterion validity of the support construct. The number of computer applications in development was used to measure the frequency of innovation; the number of organizational sub-units adopting their first computer application measured the organizational scope of innovation. The zero-order correlations between the innovation measures and support were 0.06 (non-significant) and 0.20 (significant at the 0.01 level), respectively. Thus, the results for the criterion validity of the support construct are mixed. Whether these results are a function of the nature of the chief executive's perceptions of current and expected utility is considered following analysis of the antecedents of the components of the support construct.

Measurement of the antecedent variables

Table 2 summarizes the specific variables used to measure each of the three sets of determinants discussed earlier. It also presents the expected relationships of these variables to chief executive perceptions. Implicit in our prediction of the relationships in Table 2 is our expectation that the relationships of the independent variables will be consistent across the two scales. We would expect, for example, that if operational performance is negatively associated with how the chief executive perceives the current utility of the technology, it will also be negatively associated with the chief executive's expectations about the future utility of the technology.

Table 2. Expectations about the relationships between the independent variables and the current and expected utility scales

Measurement	Independent variable	Current utility	Expected utility
TECHNOLOGICAL PERFORMANCE			
Presence of 'operational problems'—major foul-ups in day-to-day computing operations, unavailability of data for specific questions, late delivery of data processing products, difficulties in determining priorities, and getting and keeping qualified staff. (Coefficient alpha = 0.59)	Operational performance	−	−
Presence of 'organizational problems' proliferation of computer units, inadequate space for computing facilities and inappropriate department location of computing. (Coefficient alpha = 0.50)	Organizational problems	−	−
Presence of experienced data processing manager, personnel development programs, and positive rating of data processing management. (Coefficient alpha = 0.68)	Personnel performance	+	+
EXECUTIVE CONTACT			
Frequency of computer report use by chief executive, the executive's staff and the local legislative body. (Coefficient alpha = 0.75)	Utilization of computer reports	+	+
Recency of chief executive's participation in a training course	Participation in a training course	+	+
NEED DEMAND			
Organizational			
Cumulative presence of city manager form of administration, non-partisan elections, and at-large elections.	Reform	+	+
Use of professional management practices within legislative and administrative branches of government, including pay for council members, staff aides for council members, provision of services to council, use of written program objectives, and measures of performance use.	Professionalism	+	+
Size of the organizational work force servicing needs demands.	Employees *per capita*	+	+
Community			
Demographic heterogeneity combines standardized scores for percent foreign, black, Catholic, and low income.	Social diversity	−	−
Extent to which a multiplicity of groups are perceived by the chief executive as having influence in local decision making.	Pluralism	+	+
Size of community population generating needs demands	Log of population	+	+

RESULTS

Bivariate analysis

The zero-order correlations between the current and expected utility scales and the three sets of antecedent variables are presented in Table 3.

The predictions about the relationships of technological performance to chief executive perceptions are generally supported by the results for the current utility scale, but unsupported for the expected utility scale. Personnel performance has no significant relationship with either scale. Operational performance, the measure most closely associated with the actual performance of the technology, has the strongest association with current utility. Operational performance, however, has no association with expected utility. Utilization of computer-generated reports is positively and significantly associated with both scales. The results for the need/demand variables, unlike the results for the two sets of variables associated directly with the technology, are much less in accord with our expectations. The direction of the relationships for reform are opposite those we anticipated and, in one instance, are significant. Administrative professionalism is positively and significantly associated with both current and expected utility. Employees *per capita* and pluralism are significant.

Table 3. Zero-order correlations between the antecedent variables and the current and expected utility scales

	Current utility		Expected utility	
	r	(N)	r	(N)
Technological performance				
Operational performance	−0.29***	(479)	0.00	(481)
Organizational problems	−0.10*	(474)	0.00	(475)
Personnel performance	0.06	(348)	0.03	(350)
Executive contact				
Utilization of computer reports	0.40***	(503)	0.18***	(503)
Participation in training course	0.03	(500)	0.07	(500)
Need/demand				
Organizational				
Reform	−0.07*	(555)	−0.01	(559)
Professionalism	0.10**	(551)	0.08*	(555)
Employees/*capita*	0.06	(544)	0.03	(549)
Community				
Social diversity	−0.06	(541)	−0.02	(545)
Pluralism	0.12**	(542)	0.15***	(544)
Log of population	0.02	(555)	0.00	(559)

* $a < 0.05$
** $a < 0.01$
*** $a < 0.001$

Controlling for development status

As noted earlier, attitudinal studies of support tend to ignore the relationship between individual attributes and organizational attributes and, thus, the contextual situation of an adopter unit with respect to the focal innovation or innovations. This raises an issue of whether the significant relationships between the technological performance and executive contact variables and chief executive perceptions may be spurious, or, alternatively, whether they reflect the state of development of computing within the organization. Three alternative possibilities for the relationships among development status, the technology-related indicators, and the contribution of EDP as perceived by the chief executives are diagrammed in Fig. 2.

To measure the level of EDP development, a scale was created based upon the presence or absence of five information processing tasks in the local government organization. The five information processing tasks are: record keeping, calculating/printing, record restructuring, sophisticated analytics and process control [14, 31]. These information processing tasks are theoretically indicative of a progression from minor to major restructuring of the information flows within the organization. Wynne and Dickson [28, p. 26] summarize this progression:

> (1) Most organizations simply automate their existing information flows.
> (2) Some firms first revise their information flows and then automate these modernized processes.
> (3) A very few firms act upon the answer to questions such as: "What should be done differently?" and "What operations are newly feasible, given the powers of the computer?"

The five different information processing tasks were used to construct an index of information processing development by Guttman scaling. Cutpoints for the scale were based on the following criteria: (1) local governments with no more than one application in any of the categories; (2) two or more applications in the calculating/printing or calculating/printing and record-keeping categories; (3) two or more applications in the preceding two categories as well as record restructuring and sophisticated analytics, and (4) two or more applications in each of the five information processing categories. The coefficient of reproducibility for the development status scale is 0.93.

Partial correlations, using development status as the control variable, were computed between the technological performance and executive contact variables and the current utility scale to test for the relationships presented in Fig. 2. The partial correlations for the operational performance, organizational problems, and utilization of computer reports relationships remained relatively unchanged with co-efficients of −0.31, −0.11, and 0.39, respectively. This result suggests that the developmental sequence depicted in Fig. 2(a) is a good representation of the relationships among development status, the technology-related indicators, and the current utility of the technology as perceived by the chief executive.

Multiple regression analysis

The question of how well the three sets of variables predict chief executive perceptions was addressed through multiple regression analysis. Results of the regression analysis for each scale are presented in Table 4. The regression equation for current utility achieves overall significance, but the prediction equation for expected utility is non-significant.

DISCUSSION

These results raise a serious question about the probable influence of chief executive support for local government computing. Is support the rational, contingent phenomenon we conceptualized, or, is it non-rational or irrational? The findings indicate that the executives' perceptions of the current utility of computing are grounded in the assessment of a number of technology-specific factors—operational performance, organizational problems, utilization of computer reports. These variables relate as expected to

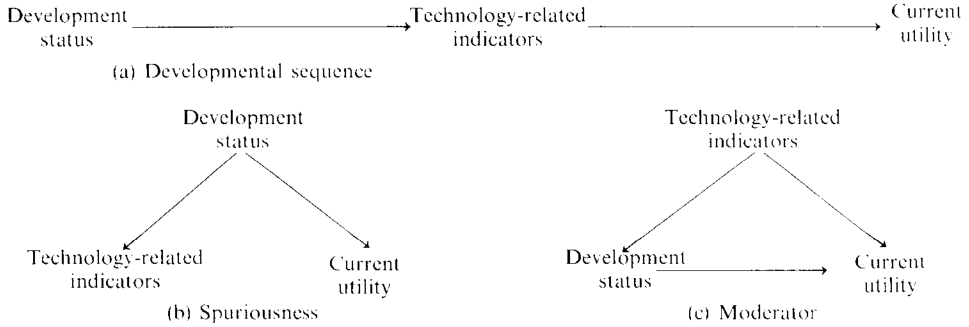

Fig. 2. Alternative models of the relationships among development status, the technology-related indicators and current utility

Table 4. Multiple regression results for the independent variables and the current and expected utility scales

	Current utility	Expected utility
Technological performance		
Operational performance	−0.25***	−0.06
Organizational problems	−0.12**	0.00
Personnel performance	0.03	0.00
Executive contact		
Utilization of computer reports	0.35***	0.16***
Participation in training course	0.10*	0.09
Need/demand		
Organizational		
Reform	−0.08	0.00
Professionalism	0.06	0.10*
Employees/*capita*	0.00	0.10
Community		
Social Diversity	−0.05	−0.10*
Pluralism	0.06	0.06
Population, logged	0.04	−0.04
Constant	1.41	0.82
R^2	0.27	0.07
F	9.47***	2.06

* $p < 0.05$
** $p < 0.01$
*** $p < 0.001$

the chief executive's perception of the current utility of computing to local government activities. These relationships still hold when the development status of the technology in the organization is considered.

However, the influence of technological performance and executive contact is reflected only selectively in the chief executive's expected utility for computing. Utilization of computer reports is positively and uniformly associated with both the current and expected utility scales. The significant negative relationships of operational performance and organizational problems to current utility, however, are not reflected in the correlations for the chief executive's expected utility. Executives who currently perceive benefits from computing along with technological and organizational problems also expect future benefits from computing, but without the technological and organizational problems.

This tendency of chief executives to anticipate future benefits from computing without the attendant problems is clearly an instance of selective perception resulting in unrealistic expectations. It suggests that some chief executives support computing innovation because they overlook the problems attendant to the technology's use. This finding might explain why there are so many failures in the implementation of computing technology in local governments and other organizations. Some executives might be giving misplaced and uncritical support to technological innovation, thereby encouraging unnecessary, counter productive, or overly-expensive innovations.

However, there is also another explanation for the selective perception, and it too probably characterizes at least some of the executives. The consistent positive relationship between top management utilization of computer reports and both current and expected utility suggests that the executives may value *personal benefits* more than *organizational disbenefits*. Computing apparently produces organizational disbenefits in the form of poor operational performance and multiple organizational problems. But, computing apparently also provides the executives with reports useful to them in decision making; and, current EDP promotional efforts probably lead them to expect even more information/decision benefits in the future. Therefore, executives who get such information and have low organizational disbenefits probably expect more of the same.

However, executives who now get such information and have high organizational disbenefits probably discount the problems as normal, or, offset by the value of getting information they want. This suggests that the executives might be paying little attention to the broader benefits and costs of data processing so long as they get personal benefits. This is clearly suboptimization which might have high costs to the organization and might increase the possibility for failures.

This assessment, together with the relationship between chief executive support and scope of local government computer application adoption, suggests that at least a portion of computing innovation in local government might be unnecessary and possibly counterproductive. Some chief executives, either because they are unrealistic about the problems with computing or because they suboptimize for personal gain, lend uncritical support to computing adoptions. If problems and failures are to be avoided, they would do well to critically examine each proposed new computing application for its own merit and for its fit with the organization's needs.

CONCLUSIONS

The results of this study indicate that reported failures to achieve the potential of urban management technologies may be as much the result of executive support as they are a lack of support. The unpredictability of executive expectations about the utility of computing clearly demonstrates a need for assessing how local government decision makers approach technological decisions which require long lead times. Poorly conceived adoptions of management technologies can multiply impediments to local government innovation created by negative user reactions and organizational inertia.

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